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ABSTRACT

The 1976 reading achievement scores of year 5 pupils in Queensland (Australia) primary schools were compared with the scores of year 5 pupils in 1971, using Reading Test QR5. The sample included 1,754 students in 111 primary schools. Analysis of the results showed that scores for vocabulary development, comprehension of implied meaning, and reading speed declined significantly from the all-time high scores of 1971. No changes occurred in total reading comprehension, comprehension of literal meaning, and scores on the QR5 basic reading test. Concern for decline in reading test scores led to a retest in 1977, which showed no change in reading ability between 1976 and 1977. Although reading achievement in 1977 was lower than in the peak year of 1971, achievement was higher in 1977 than in any other periodic survey since 1955. (RL)

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A COMPARISON OF THE READING ACHIEVEMENT OF QUEENSLAND YEAR 5 PUPILS BETWEEN 1971 AND 1977

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June 1979

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ABSTRACT

In 1976, the reading achievement of a representative sample of Queensland Year 5 pupils was assessed. The aim of this testing was to compare reading achievement in 1976 with reading achievement in 1971. It was found that, for three components of reading ability, a decline had occurred between 1971 and 1976. To further assess the reading achievement of Queensland Year 5 pupils, the 1976 survey was replicated in 1977. Analysis of these results showed that there was no difference in reading achievement of Queensland Year 5 pupils between 1976 and 1977. It was shown that although there was a decline in reading achievement between 1971 and 1977, the standard achieved in 1977 was the second highest recorded since 1955.

INTRODUCTION

At regular intervals over the last forty years, standardised tests of educational achievement have been administered to pupils in various years of schooling in Queensland primary schools. The main purpose of this testing has been to determine whether changes have occurred, over time, in standards of achievement in certain basic skills.

The reading ability of Year 5 students in Queensland schools has been surveyed a number of times since 1946. Reading skills such as vocabulary, comprehension and speed of reading have been examined in these surveys. In 1971, and again in 1976, a test designed to measure achievement in these three components of reading was administered to a representative sample of Year 5 primary school students in Queensland State schools. This report examines the changes, if any, between 1971 and 1976 in the reading achievement of Year 5 students.

Between 1971 and 1976, a number of important developments in primary education in Queensland have occurred. Many of these changes provided teachers with the opportunity for greater flexibility in selecting course content, and in choosing instructional strategies. In order to provide some understanding of the context in which the survey was undertaken, a brief review of the major developments which occurred during the five year period follows.

Curriculum Changes

Two major innovations have provided schools with much greater freedom of choice in selecting content of language arts courses and in choosing appropriate teaching resources.

Firstly, a new Language Arts Curriculum Guide, introduced progressively since 1974, provides a different emphasis for the teaching of language arts than that of the previous syllabus. In the new program, the child is the focal point, in that emphasis is placed on individual language development and growth in four key areas of communication: listening, speaking, reading and writing. The integration of these areas to enhance language experience, self expression and social communication opposes the notion of prescribed grade content and skill development as ends in themselves, isolated from the individual's language, which characterised the earlier syllabus. This is not to suggest that skills are less important but rather that the processes involved in their development involve a concern for the individual's language acquisition and growth.

Secondly, Queensland State primary schools were offered direct financial assistance on a per capita basis through an annual grants list scheme. The purpose of this direct funding procedure was to enable schools to select their own reading programs, to purchase supplementary activity material of their own choice, to determine what audio-visual equipment was appropriate to fulfil the school's needs, and to choose library equipment to match their pupils' interests. As a consequence the quality and range of resources for language arts teaching increased.

Professional and Ancillary Support

Since the last Year 5 periodic survey was undertaken, a number of initiatives have been taken to increase the provision of both professional and ancillary support available to teachers.

One such development has been the gradual change in role of the primary inspector. Inspectors now give more emphasis to providing educational advice and leadership than in the past. Thus they now play a greater part in assisting schools to plan and implement school based curricula.

During the 1971–76 period, the advisory teacher service continued to expand. The number of advisory teachers in primary schools throughout Queensland increased from 14 in 1971 to 79 in 1976 (Department of Education, 1977). The role of the advisory teachers is generally to assist teachers in implementing curricula. No direct link between the use of advisory teachers and pupil performance has been established. However, the results of a study by Varley & Cumming (1976) indicate that teachers believe the advice received from advisory teachers improves the quality of their teaching.

In order to provide remedial support for children, remedial/resource teachers have been appointed to many of the larger primary schools in Queensland. Their function is to assist the classroom teacher in the task of ensuring that children with special needs acquire a level of competence in basic skills.

Teacher librarians have been appointed to most State schools with enrolments in excess of 300. In addition, library advisors have been appointed at a regional level to assist teachers in schools without the services of a teacher librarian.

The 1971–76 period also saw an increase in the number of ancillary staff provided to assist teachers. In 1973, the first teacher aides and library aides were appointed. Teacher aides may be engaged in a wide variety of activities ranging from routine clerical duties and classroom maintenance tasks to supervising small groups of pupils. It was felt that the appointment of these ancillary staff would allow teachers greater freedom to participate in professional activities, such as being able to allocate more time for individual pupil instruction. Research from overseas has indicated that the employment of teacher aides has freed the teacher from many non-teaching tasks and may, indeed, increase student achievement (Riessman & Gartner, 1969; Gudridge, 1972).

Pre-Service and In-Service Teacher Education

There have been notable changes in the nature of both pre-service and in-service teacher education programs since 1971.

After 1972, teachers colleges became autonomous colleges of advanced education. These colleges now provide a broad curriculum for their students. In the past, teachers colleges tended to offer a program of preparation which would enable teachers to implement and teach from existing syllabuses. Currently, college courses place greater emphasis on equipping prospective teachers with the skills necessary to develop comprehensive and flexible teaching programs in schools and to adapt readily to curriculum changes that occur from time to time.

Generally, there has been an increase in the number and range of in-service courses available to teachers in the 1971–76 period. One notable development has been the provision of five and six week in-service programs, including in-depth curriculum studies in areas such as reading. As well as Statewide programs, courses have been organised for teachers at both a regional and local level. A further development in in-service education was the practice of withdrawal of whole school staffs for review of school policies and practices. In these cases, specially trained in-service relieving staffs take over the teaching and administrative duties in the school for the period that the original staff is withdrawn.

Professional Qualifications of Teachers

A review by Bargen and Walberg (1974) has indicated that an increase in the professional qualifications of teachers is associated with an increase in student achievement. It is thus important to note that the professional qualifications of teachers greatly increased from 1971 to 1976. For the first time, in 1972, three year graduates from Queensland training courses entered the teaching profession. By 1974, all teachers entering Queensland State primary schools had at least three years of training. In addition, the number of four-year trained teachers in State primary schools rose from 82 in 1971 to 773 in 1976 (Department of Education, 1977). The influx of overseas teachers, a large proportion of whom were trained for four years, contributed to this increase (John, McBryde & Hills, 1977).

Class Size and Classroom Organisation

All permanent primary school classrooms which have been constructed since 1971 are of the multiple-area type. In addition, many existing buildings, both permanent and temporary, have been modified to provide more flexible teaching areas. Teaching spaces of this kind provide teachers with the opportunity to use a wide range of instructional techniques and patterns of organisation.

One other notable change in primary education during the 1971–76 period has been the continuing decrease in class size. Average class size has declined from 31.9* pupils per teacher in 1971 to 28.3* in 1976. It cannot simply be assumed, however, that smaller classes mean greater achievement. A review of Lafleur, Sumner & Witton (1975) found that there was no conclusive evidence for an effect of class size on pupil achievement.

In summary, a number of important developments and innovations have occurred in primary education in Queensland since the educational standards of Year 5 pupils were last assessed in 1971. These include:

- the progressive implementation of a new language arts syllabus from 1974 onwards;
- the freedom of choice of schools in selecting their own reading schemes;
- the provision of additional support staff, ranging from teacher aides to library advisors, and advisory teachers;
- a greater opportunity for schools to implement curriculum innovations at a local level, with primary school inspectors providing advisory support;
- the entry into the service of three-year trained teachers, trained in autonomous colleges of advanced education;

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* Calculated from School Census Returns by Planning Branch, Queensland Department of Education. Excludes open-area classes, one-teacher schools, and special groups attached to primary classes.

- an increase in the professional qualifications of teachers and a broadening of the education of teachers in pre-service courses;
- an increase in the provision of in-service courses for teachers;
- a continued decrease in class size; and
- the construction of a greater number of multiple-area classrooms.

It is clear therefore that the period since 1971 was characterised by significant changes in education. The multiple changes in this period make it virtually impossible to relate reading achievement to specific components of change without considerably more data than is available in this study.

These changes in themselves were clearly undertaken with the expectation of benefit and one would expect the overall results of this survey in part to reflect such effects. However, it should be noted that many benefits might not be directly indexed by the reading test used. For example, such aspects as breadth of educational experience, pupil and teacher satisfaction, and other desirable improvements are clearly not measured directly by reading vocabulary, reading comprehension, speed of reading and basic reading ability. Nonetheless, reading ability is a crucial component of education and the need to monitor trends in pupil reading achievement over time is imperative.

COMPARISON OF READING ABILITY

IN 1971 AND 1976

Sampling Procedures

The sampling procedures adopted for the 1976 survey were aimed at ensuring that each Year 5 pupil in the State had an equal chance of being selected in the sample.

Queensland State primary schools are classified as Class 1, 2, 3, 4, 5 or 6 schools according to effective enrolment. They may also be classified according to geographical location. Schools within the boundary of Brisbane City are classified as metropolitan schools. Schools within the boundary of other cities are classified as being provincial city schools. All other schools are country schools.

A two stage stratified cluster sample was used to select pupils. Schools were stratified according to class of school and geographical location (metropolitan, provincial city, country). The schools for the sample were selected by the IEA 'ticket' system (Husen, 1967). Each school was allocated a number of tickets corresponding to its Year 5 enrolment. An equal interval random start method was then used to select schools within strata. Thus, the probability of a particular school being selected was proportional to its effective Year 5 enrolment.

If a selected school in the population had an effective Year 5 enrolment of less than 25, schools subsequent to it on the stratified school list were added to it until the 'pseudo-school' so created had an effective enrolment of at least 25 pupils in Year 5. When there was only one Year 5 class in a selected school, that entire class was tested. In schools with more than one Year 5 class, one class was chosen at random to be tested. If the Year 5 enrolment in any selected class or pseudo-school exceeded 25 pupils, a random sample of 25 pupils was taken and the tests of the remaining pupils discarded. In all other schools, all children tested were included in the sample.

The above sampling procedures resulted in a sample of 1754 pupils from 111 schools being included in the survey. A list of the schools involved, and the representativeness of the sample are shown in Appendix A.

Test Administration

Several weeks before testing was to be undertaken, the principals of the schools selected to participate were notified by letter that testing would be carried out. The letter stressed that individual schools would not be identified and that no comparisons would be made between specific schools. Schools were asked to continue with the normal school program, so that no attempt would be made to inflate the test scores.

Selected schools were subsequently forwarded copies of the test instruments, answer sheets and directions for administering the tests. In schools with more than one Year 5 class, the principal was advised of the particular draft to be tested. Testing was conducted on 27 October 1976.

Students' answer sheets were returned to the Research Branch for marking.

Tests Used

From 1946 to 1971, the reading achievement of Year 5 pupils was assessed by means of the ACER Reading for Meaning and Speed of Reading Tests, which were initially developed in 1933. On all but one occasion since 1946, Form C of these tests was used. However, the tests were withdrawn from general sale by ACER in 1971.

A new test, QR5, developed from *Test R: Reading* from the New South Wales Basic Skills Battery was prepared to assess reading performance of Year 5 pupils in Queensland. In 1971, both the ACER tests and the QR5 test were administered. Results on the ACER tests were used to compare reading achievement in 1971 with reading achievement in previous years. The performance of Year 5 pupils on QR5 became the new basis for comparisons of reading achievement in 1971 and subsequent years.

The Reading Test QR5 provides measures of reading comprehension, reading vocabulary and speed of reading. The test consists of a number of graded passages covering a variety of topics. Each passage is followed by a number of vocabulary and comprehension questions. There are 100 questions in the test, and time allowed for completion is 40 minutes. Year 5 pupils are not expected to complete the entire test. Because of this the test is classified as a speed test in which rate of responding is an important factor.

Overall, there are 45 vocabulary items and 55 comprehension items distributed throughout the test. The comprehension items may be further divided according to whether they test literal meaning or implied meaning. There are 29 items testing literal meaning and 26 which test implied meaning. Understanding of implied meaning involves a level of cognition above that of simple word recognition or recall of factual information. A full description of literal and implied meaning may be found in Research and Curriculum Branch Bulletin No. 4. (Department of Education, 1972).

In addition to the above measures, QR5 also provides a measure of speed of reading. On Reading Test QR5, speed of reading was defined as the total number of items answered correctly by the student. This method of determining speed of reading was somewhat different from the way it was calculated on *Test R: Reading* of the New South Wales Basic Skills Battery from which Reading Test QR5 was derived. Test R, like QR5, contained more items than the majority of pupils would be expected to complete in the time allowed. On Test R, a speed of 'study reading' score was calculated. This was defined as the number of the last item attempted, without any deductions for incorrect responses or items not attempted. Clearly, the speed of 'study reading' score gives no indication that the student has comprehended what he has read. For this reason, it was decided, in 1971, that speed of reading on QR5 would be measured by the total number of items answered correctly. However, it should be noted that speed of reading on QR5 is actually the sum of vocabulary and comprehension scores. Thus, performance of students in vocabulary and comprehension will determine their speed of reading achievement.

To remove the speed component, the number of items which the majority of Year 5 pupils could be expected to complete in the 40 minute time period allotted was calculated from the results of the 1971 administration. By so doing, a basic test comprising the first 45 items was identified. Performance of pupils on these 45 items provides an overall measure of reading ability which is largely independent of rate of response or speed of working through the test.

Of the 45 items in the basic test, there are 20 vocabulary items and 25 comprehension items. Of the latter, 13 measure literal comprehension, and 12 measure implied comprehension. Thus, the full test and the basic test have approximately the same proportion of each type of item.

The distribution of items in Reading Test QR5 on both the basic 45 item test and the full 100 item test is shown in Table 1.

TABLE 1: DISTRIBUTION OF ITEMS ON QR5 BASIC TEST AND FULL TEST

BASIC TEST				FULL TEST (SPEED OF READING)			
No. of Items	No. of Vocabulary Items	No. of Comprehension Items		No. of Items	No. of Vocabulary Items	No. of Comprehension Items	
		Literal Meaning	Implied Meaning			Literal Meaning	Implied Meaning
45	20	13	12	100	45	29	26

Analysis Undertaken

Analysis of variance procedures were used to determine if changes in standards of reading of Queensland Year 5 pupils between 1971 and 1976 had occurred. Since the sample was a stratified cluster sample, it could not be analysed under the assumption of simple random sampling.

In drawing the schools to participate in the 1976 survey, geographical location was used as one of the factors in the sampling design. An examination of the list of schools from which the sample was drawn indicated that, due to demographic change, some schools classified as country on the list could, in many ways, be regarded as either metropolitan or provincial city. As a consequence, some selected schools were unlikely to truly exhibit the characteristics of the geographical strata to which they were ascribed. Thus, geographical location was not included as a factor in the analysis of variance design used in this study.

In testing for significance of effects, a hierarchical approach was used. That is, the year effect was calculated removing the class of school effect. Similarly, the class of school effect was calculated with year effect eliminated. This hierarchical approach eliminates possible bias in interpretation due to correlation between year of testing and class of school. Thus the possibility of spuriously inferring that change has occurred is reduced.

Results

As indicated previously, the Reading Test QR5 replaced the ACER Reading for Meaning and Speed of Reading Tests in 1971. The test QR5 became the new standard to be used for monitoring the reading performance of Queensland Year 5 pupils over time. Before considering the results of the 1976 administration of QR5, it is useful to examine the results up until 1971 on the ACER tests, so that the 1976 results can be seen in the light of results obtained from the various surveys conducted since 1946. The results on the ACER tests from 1946 to 1971 are shown in Table 2.

TABLE 2: MEAN SCORES ON ACER FORM C READING FOR MEANING AND SPEED OF READING TESTS, 1946 TO 1971

Test	Year of Testing				
	1946	1955	1960	1965	1971
Reading for Meaning	24.0	25.0	22.8	23.3	27.1
Speed of Reading	14.0	*	11.9	12.0	11.9

* Not administered

As can be seen from Table 2, variations in reading for meaning ability of Queensland Year 5 pupils had been occurring since the 1946 testing was undertaken. Between 1965 and 1971, an abnormally large increase of 3.8 points occurred. This was the largest measured change betweeen any two consecutive periods of testing. In fact, the results obtained from Year 5 students sampled in the 1971 survey indicated that they were the most competent readers for meaning during the entire period of testing.

The current survey takes on a new perspective. The bench mark score for Reading Test QR5, on which the comparison is made, was established on a group of pupils who were the most competent readers for meaning in the period 1946–71. Evidence that this standard had been maintained or improved in the context of the range of educational changes cited in the Introduction would be of significance. Table 2 also shows that speed of reading, as measured by the ACER Speed of Reading (Form C) test had remained essentially constant in surveys conducted between 1960 and 1971. Continued maintenance or improvement in this aspect of reading is also of importance.

There are a number of results derived from the Reading Test QR5. The overall comprehension results and the results of the literal and implied meaning components are shown in Table 3. These results reflect a speed component.

TABLE 3: MEAN SCORES AND STANDARD DEVIATIONS FOR THE COMPREHENSION COMPONENTS OF READING TEST QR5, 1971 AND 1976

Year		Reading Comprehension		
		Literal (29) *	Implied (26) *	Total (55) *
1971	Mean	14.4	11.9	26.3
	S.D.	5.6	5.4	10.6
1976	Mean	14.0	11.2	25.2
	S.D.	5.4	5.2	10.2
Mean difference 1971 to 1976		− 0.4	− 0.7	− 1.1

* Note: Numbers in brackets indicate the number of items in each component of the test

To determine if statistically significant changes in the components of reading comprehension occurred between 1971 and 1976, a two way analysis of variance was undertaken. The factors used were year of testing and class of school. The analysis of variance results are presented in detail in Tables 13–15 in Appendix C.

The results of the statistical test for significance of difference indicated no class of school effects for any of the aspects of reading comprehension and no significant interaction effects. Thus, unlike previous surveys where there were significant differences associated with size of school, all classes of schools performed equally well. Means for each class of school have therefore not been reported in the text.

The tests of significance for year of testing are of interest to ascertain whether or not the high standard achieved in 1971 has been maintained. For the total comprehension result the mean difference between 1971 and 1976 of −1.1 was not statistically significant. Thus it can be concluded that for total comprehension the 1976 result was not different from that obtained in 1971. A similar result was obtained for the test of difference for the mean scores for literal comprehension. The mean difference of −0.4 was also not statistically significant. Again, it can be concluded that for literal comprehension the result for 1976 was not different from that obtained in 1971.

The test of significance for implied meaning was significant at the .05 level of probability ($F = 4.81$, df 1,116). Thus, the mean difference of − 0.7 from 1971 to 1976 constitutes a significant decline even though the decline in total comprehension and comprehension of literal meaning were not significant.

The results for reading vocabulary are shown in Table 4. Again, these results are based on a test with a speed component.

TABLE 4: MEAN SCORES AND STANDARD DEVIATIONS FOR THE READING VOCABULARY COMPONENT OF READING TEST QR5, 1971 AND 1976

Year		Reading Vocabulary (45)
1971	Mean	17.9
	S.D.	9.0
1976	Mean	16.3
	S.D.	8.2
Mean difference 1971 to 1976		− 1.6

A similar analysis of variance with year and class of school as the factors was performed to ascertain whether mean differences were statistically significant. Results are shown in Table 16 in Appendix C.

An examination of this table indicates that there were no significant class of school effects nor any significant interactions between year and class of school. The main effect for year, however, was statistically significant at the .01 level of probability. Thus, the mean difference between 1971 and 1976 of −1.6 represents a statistically

significant decline for reading vocabulary. Therefore, the high standard attained in 1971 has not been maintained.

Results for the speed of reading component are simply the sum of results for reading vocabulary and reading comprehension on the total 100 item QR5 Reading test. Thus, speed of reading is calculated differently in QR5 than in the ACER test.

On the latter test, pupils were presented with a piece of continuous prose. Every 50 words contained 47 words of prose, followed by three words in a bracket. Pupils were required to select the one which made the best sense in the story. Speed of reading using the ACER test, was measured by the number of correct responses. While a certain amount of testing of comprehension is implicit in assessing speed of reading by this method, the words in the story were selected so as to be well within the vocabulary of a Year 4 child. Hence, the comprehension component of speed of reading on the ACER test was kept to a minimum.

Results for speed of reading on the QR5 test are shown in Table 5.

TABLE 5: MEAN SCORES AND STANDARD DEVIATIONS FOR THE SPEED OF READING COMPONENT OF READING TEST QR5, 1971 AND 1976

Year		Speed of Reading (100)
1971	Mean	44.1
	S.D.	19.1
1976	Mean	41.5
	S.D.	17.9
Mean difference 1971 to 1976		− 2.6

Results of the two way analysis of variance similar to that performed for the other areas measured, are shown in Table 17. The only significant effect was for year of testing. The mean difference between 1971 and 1976 of −2.6 was statistically significant at the .05 level of probability ($F = 5.81$, df 1,116). This represents a significant decline between 1971 and 1976.

Because speed of reading on QR5 is defined as the total number of items answered correctly in the entire 100 item test, the result is not merely a measure of the rate at which a person progresses through the test, but also a measure of the level of understanding the person has about the material read. Hence, any change in levels of vocabulary or comprehension achievement would automatically affect the speed of reading score.

Taken together the results indicate that on the various components of the 100 item speeded test, there was no significant difference between the 1971 and 1976 results for total comprehension or for the literal meaning component. There was a slight decline for comprehension of implied meaning. A much larger decline was found for the reading vocabulary component. This decline was the major source of the decline in speed of reading.

It should be noted that all results reported so far are based on the speeded test in which rate of responding is important. The results on the 45 item basic test which contains 25 comprehension items and 20 vocabulary items are shown in Table 6.

TABLE 6: MEAN SCORES AND STANDARD DEVIATIONS FOR THE BASIC TEST COMPONENT OF READING TEST QR5, 1971 AND 1976

Year		Basic Test (45)
1971	Mean	27.8
	S.D.	8.5
1976	Mean	27.1
	S.D.	8.4
Mean difference 1971 to 1976		– 0.7

Analysis of variance results for the test of significance of difference among means is shown in Table 18. There were no statistically significant differences for size of school and no significant interactions. The mean difference of –0.7 between 1971 and 1976 was also not statistically significant. Thus on the basic test, where the speed component had been largely removed, the high 1971 standard was maintained.

Taken in the light of the other results, the 1976 sample of Year 5 pupils performed equally as well as those in the 1971 sample in a number of areas. For the speeded test in total comprehension there was no difference between years. Similarly there was no difference between years in the literal comprehension component of total comprehension. There was a decline in comprehension of implied meaning and a decline in reading vocabulary. There was also a decline in speed of reading which reflected the relatively large decline in reading vocabulary and the somewhat smaller decline in comprehension of implied meaning. For the basic test there was no decline. Thus the main source of difference is to be found in the area of reading vocabulary measured by the speeded test.

Given the decline in a number of areas measured by the Test QR5 between 1971 and 1976 it was seen as desirable to obtain further measures in 1977.

COMPARISON OF READING ABILITY IN 1976 AND 1977

The context in which the 1977 testing was undertaken was essentially the same as that in which the 1976 testing was conducted. No new major system-wide changes occurred during the two years. There was, rather, a continuation and expansion of the programs which had been developed previously. The number of advisory teachers increased from 79 in 1976 to 99 in 1977 (Department of Education, 1978). In-depth curriculum courses in various subject areas continued to be offered. These provided schools with teachers, skilled in particular areas, who were then able to act as resources persons within their own school. Teachers were increasingly developing school-based programs to meet the particular needs of their pupils. Inspectors continued to play a major role in this context as curriculum advisor to teachers and schools. The Language Arts Curriculum Guide which had only been fully implemented in 1975 had now been effective for a further year.

Methodology

The schools which were selected to participate in the 1977 survey were the same as those chosen for the 1976 survey. This was done to reduce the error term in the analyses of variance and hence provide more powerful tests of significance.

Sampling of pupils within a chosen school or pseudo-school and test administration procedures were identical to those used one year earlier. Testing was carried out on 17 November 1977. In all, 1569 pupils from 90 schools were included in the final sample. Thirty-three of these schools were amalgamated to form ten pseudo-schools. Thus, the 1977 sample was composed of 67 schools or pseudo-schools.

As the same schools were used in both 1976 and 1977, a slightly different analysis of varaince model was assumed. School means were used as the unit of analysis rather than scores of individual pupils. In order to run the computer program to test for statistical significance of differences, it was necessary to include in the analysis only those schools or pseudo-schools which had data for both 1976 and 1977. Since five of the 1977 schools or pseudo-schools did not have data for the 1976 testing, only 62 of the 67 schools or pseudo-schools in the 1977 sample were included in the analysis. Year of testing and class of school were the factors used in the two way analysis of variance design. The model is discussed in Appendix B.

Results

Results on the various components of Reading Test QR5 for 1976 and 1977 are shown in Table 7.

A summary of the analyses of variance carried out to determine if changes in scores between 1976 and 1977 had occurred is shown in Table 19, in Appendix C. These results indicate that no significant changes for year of testing in any component of reading ability occurred between 1976 and 1977. Nor were there any significant class of school effects or interaction effects apparent.

TABLE 7: MEAN SCORES AND STANDARD DEVIATIONS FOR COMPONENTS OF READING TEST QR5, 1976 AND 1977

Year	Comprehension			Vocabulary (45)	Speed of Reading Number of items correctly answered (100)	Basic Test First 45 items (45)
	Literal (29)	Implied (26)	Total (55)			
1976 Mean	14.0	11.2	25.2	16.3	41.5	27.1
S.D.	5.4	5.2	10.2	8.2	17.9	8.4
1977 Mean	14.2	11.4	25.7	16.6	42.3	27.3
S.D.	5.4	5.2	10.2	8.3	17.9	8.3
Mean differences 1976 to 1977	0.2	0.2	0.5	0.3	0.8	0.2

These results show clearly that the 1976 and 1977 levels of reading achievement are lower than those in 1971. But how do the 1976 and 1977 results compare with those found in surveys prior to 1971? Because of the change, in 1971, of the tests used to assess reading ability of Queensland Year 5 pupils, it is not possible to make direct comparisons between results obtained in 1976 and 1977 with results obtained in periodic surveys prior to 1971.

However, while differences in raw scores hold no meaning in this situation, the raw score differences can be converted to units on the same scale. Once this is done the differences between 1971 and 1977 can be directly compared with the differences between 1965 and 1971. This is accomplished by expressing the differences in standard deviation units. To express the difference between the 1965 and 1971 results in standard deviation units, the difference in scores on the ACER Reading for Meaning Test in these two years is divided by a pooled estimate of the standard deviation of scores in those years. In a similar manner, changes in scores on QR5 between 1971 and 1977 may be given in standard deviation units. Table 8 shows these results.

TABLE 8: CHANGES BETWEEN 1965 AND 1977 IN STANDARD DEVIATION UNITS

Period	Measure	Change in Standard Deviation Units
1965–1971	ACER Reading for Meaning – Form C	+.35
1971–1977	QR5:	
	Literal Meaning	– .04
	Implied Meaning	– .09
	Total Comprehension	– .06
	Vocabulary	– .15
	Speed of Reading	– .10
	Basic Test	– .06

Table 8 shows that, on the ACER Reading for Meaning Test, there was a rise of 0.35 standard deviation units between 1965 and 1971. Between 1971 and 1977, the greatest decline was in reading vocabulary. In this case, the fall was 0.15 standard deviation units. Thus, the decrease in reading ability between 1971 and 1977 was less than half as great as the increase between 1965 and 1971. It can be concluded, therefore, that reading ability of Queensland Year 5 pupils was lower in 1977 than in 1971, but higher than in 1965.

DISCUSSION

This study examined the changes in reading achievement of Queensland Year 5 pupils between 1971 and 1977. The results showed that there has been no change in total reading comprehension or in performance on the non-speeded basic reading test. There has, however, been a statistically significant decline in vocabulary performance and in ability to understand implied meaning. In addition, a statistically significant decline in speed of reading has occurred since 1971. Speed of reading, as defined in this context, is the sum of vocabulary and reading comprehension scores. Hence, the decline in speed of reading can be accounted for mainly by the changes in vocabulary performance, and to a lesser extent, by the fall in the implied comprehension score. There has thus been a decline in some areas of reading achievement from 1971 to 1977. But how does the 1977 level of achievement compare with that of other years?

As the Results section of this report shows, the decline in reading achievement between 1971 and 1977 was substantially less than the increase between 1965 and 1971. Thus the standard of reading achievement in 1977 was greater than that in 1965. The 1965 standard was, in turn, greater than that in 1960. In short, the 1977 results were the second highest recorded of the last five periodic surveys. Only in 1971 was the level of reading achievement greater. A plausible explanation of the decline from 1971 to 1977 would, therefore, be that the 1971 result was spuriously high, due perhaps to sampling variation. However, this explanation is by no means certain and we must, in conscience, accept the fact of a decline and seek reasons for it.

In examining the educational changes discussed in the Introduction to this report, one candidate stands out in the search for causes of the decline: the introduction of a new Language Arts Curriculum Guide.

The Language Arts Curriculum Guide was fully introduced only in 1975, and represents a significant change from the former English Syllabus. Because of this difference between the two curriculum guides, primary school teachers would have needed a substantial period of time before they became fully conversant with the new Curriculum Guide and could implement it confidently.

The decline in reading achievement evident since the introduction of the Guide may perhaps be partly due to this learning process amongst teachers. Thus the Language Arts Curriculum Guide may have affected achievement simply because it was an innovation. However, the substance of the Guide could also have had an effect on achievement. Compared to the former English Syllabus, the new Language Arts Curriculum Guide widened the scope of language arts in primary schools. The old Syllabus, for example, gave very little emphasis to the development of listening and observing skills, while the new Guide gives significant emphasis to these areas. With this broadening of the Language Arts curriculum in 1975, it might be expected that teachers would spend less

time on the areas common to the old and new syllabuses. Such a change in allocation of time could well lead to a decline in achievement in the areas, such as reading, common to both syllabuses, and to an increase in achievement in the areas newly emphasised in the 1975 Language Arts Curriculum Guide (see Peaker, 1975, for evidence of the effect of time allocation on achievement). If there were such an increase in achievement to balance the decline in reading skills, this study would not have revealed it. Only a narrow range of language skills was measured by the Reading Test QR5. The assessment of Year 5 pupils in other domains of language must be left for future studies.

The introduction of a new Language Arts Curriculum Guide was not the only innovation in the 1971–77 period. It is possible that any of the other educational innovations discussed in the Introduction could have had an adverse effect on the reading ability of Queensland Year 5 pupils. One reason for such an adverse effect could be that the educational system requires time to adjust to some innovations, and that while the short term effects are neutral or negative, the long term effects are beneficial. An alternative explanation is that some of the innovations quite simply have a negative effect on reading achievement. These are mere speculations, however. This study does not have the data available to determine which, if any, of the innovations are responsible for the apparent decline in reading achievement.

What this study can do is to alert both teachers and administrators to the fact that there is cause for concern about the reading standards of Year 5 pupils in Queensland schools. It should emphasise to teachers the need to critically examine their teaching programs and the level of reading skills achieved by their pupils. In addition, administrators and researchers must examine the system to find reasons for the apparent decline in reading achievement. Such an examination is already in progress. In 1978, the Research Branch of the Department of Education began an evaluation of the Language Arts Curriculum Guide in order to identify weaknesses in the Guide and to suggest possible modifications. A report of this study should be available in the near future.

SUMMARY

The major purpose of this survey was to compare reading achievement of Year 5 pupils in Queensland primary schools in 1976 with reading achievement of Year 5 pupils in 1971.

Reading Test QR5 was administered to a sample of 1754 Year 5 students in 111 primary schools in October 1976.

Analysis of the results showed that there was a statistically significant fall, from the all time high of 1971, in vocabulary development, comprehension of implied meaning and speed of reading. No changes occurred in total reading comprehension, comprehension of literal meaning or scores on the basic reading test with QR5.

Because of concern over the decline, Reading Test QR5 was again administered to a sample of Year 5 pupils in 1977. Analysis of these results showed no change in reading ability between 1976 and 1977. It was shown that while reading achievement in 1977 was lower than in the peak year of 1971, achievement was higher in 1977 than in any other periodic survey since 1955.

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APPENDIX A: DETAILS OF POPULATION AND SAMPLE TESTED

TABLE A: SCHOOLS SELECTED TO PARTICIPATE IN THE 1976 SURVEY

Class I

Blackwater; Caloundra; Dalby; Goodna; Kingston; Lawnton; Moranbah; Scarborough; Woodridge; Acacia Ridge; Aspley East; Corinda; Geebung; Indooroopilly; Kelvin Grove; Manly West; Moorooka; Mt Gravatt East; Nundah; Runcorn; Serviceton South; Stafford Heights; Virginia; Wynnum North; Walkervale; Edge Hill; Benowa; Burleigh Heads; Musgrave Hill; Bundamba; Mackay North; Sunset; Berserker Street; Rangeville; Aitkenvale; Mundingburra.

Class II

Ayr; Cannon Hill; Collinsville; Emerald; Innisfail; Mitchell; Pialba; Sarina; Tara; Weipa; Brighton; Carole Park; Enoggera; Mansfield; Oakleigh; Sunnybank; Windsor; Bundaberg Central; Clinton; Mackay West; Happy Valley.

Class III

Amberley; Calliope; Dysart; Hambledon; Machan's Beach; Macknade; Park Ridge; Surat; Tambo; Winton; Woongoolba; Calamvale; Rainworth; Tivoli; Townsville South; Townsville West.

Class IV

Bollon; Bongeen; Boulia; Elliott Heads; Emu Creek; Eton; Kaimkillenbun; Kairi; Kalapa; Kandanga; Mount Sylvia; Mount Tyson; Mudgeeraba; Mulgildie; Theebine; Thornton; Thulimbah.

Class V

Amby; Back Plains; Balnagowan; Bancroft; Beeron Road; Begonia; Benair; Benarkin; Birdsville; Blenheim; Norwin; Numinbah Valley; Oakenden; Ormeau; Peachester; Pelican; Pimpama.

Class VI

Stonehenge; Swanfels; Tarome; Teelba; Tingoora; Vale View; Veresdale Scrub; West Hill; Wheatlands; Winfield; Woolooga; Wyberba; Yalboroo; Yalleroi; Yaraka; Yuleba Creek.

TABLE 10: DISTRIBUTION OF POPULATION AND SAMPLE OF YEAR 5 PUPILS BY CLASS OF SCHOOL – 1976

Class	Pupils in Sample		Pupils in Population	
	Number	Per cent	Number	Per cent
1	822	46.9	13337	45.3
2	483	27.5	8854	30.1
3	256	14.6	4380	14.8
4	119	6.8	2126	7.2
5	49	2.8	521	1.8
6	25	1.4	217	0.7
Total	1754		29415	

TABLE 11: DISTRIBUTION OF POPULATION AND SAMPLE OF YEAR 5 PUPILS BY CLASS OF SCHOOL – 1977

Class	Pupils in Sample		Pupils in Population	
	Number	Per cent	Number	Per cent
1	786	50.2	13554	44.5
2	416	26.5	9493	31.1
3	246	15.7	4680	15.4
4	64	4.1	1960	6.4
5	43	2.7	554	1.8
6	12	0.8	239	0.8
Total	1567		30480	

TABLE 12: AVERAGE AGE OF YEAR 5 PUPILS BY YEAR OF TESTING

Year	Average age
1946	11 years 4 months
1955	11 years 0 months
1960	10 years 6 months
1965	10 years 6 months
1971	10 years 3 months
1976	10 years 3 months
1977	10 years 2 months

APPENDIX B: ANALYSIS OF VARIANCE MODELS

A discussion of analysis of variance models and the notation used here can be found in Myers (1972).

For comparing scores between 1971 and 1976, the model assumed was:

$$Y_{ijkl} = \mu + \alpha_k + \beta_l + (\alpha\beta)_{kl} + \gamma_{j/kl} + \epsilon_{ijkl}$$

Y_{ijkl} — score of individual i in school j in year of testing k and class of school l

μ — grand mean, common to all individuals

α_k — main effect of year of testing k

β_l — main effect of class of school l

$(\alpha\beta)_{kl}$ — interaction effect of year of testing k and class of school l

$\gamma_{j/kl}$ — effect due to school j within year of testing k and class of school l

ϵ_{ijkl} — residual component, reflecting individual differences and error of measurement.

The appropriate error term for year and class of school main effects and the interaction effect of these two factors is $\gamma_{j/kl}$, i.e. schools within year by class.

For comparing the 1976 and 1977 scores, a slightly different analysis model was assumed. In this case, the unit of analysis was the school. The model assumed was:

$$Y_{ijk} = \mu + \alpha_j + \beta_k + (\alpha\beta)_{jk} + \gamma_{i/k} + (\alpha\gamma)_{ji/k}$$

Y_{ijk} — mean score obtained by students in school i within class of school k in year of testing j

μ — grand mean, common to all schools

α_j — main effect of year of testing j

β_k — main effect of class of school k

$(\alpha\beta)_{jk}$ — interaction effect of year of testing j and class of school k

$\gamma_{i/k}$ – effect due to school i within class of school k

$(\alpha\gamma)_{ji/k}$ – effect due to interaction of year of testing j and school i within class of school k.

In the above model, as the same schools were used in both years, an interaction effect of year of testing and school is incorporated into the model. The appropriate error term for the year and year by class effects is $(\alpha\gamma)_{ji/k}$, i.e. year by schools within class. For the class of school effect, the appropriate error term is $\gamma_{i/k}$, i.e. schools within class.

The computer program used to analyse the data was MULTIVARIANCE (Finn, 1974). While the 1971–76 data was analysed as a two way multivariate analysis of variance with raw test scores as the dependent variables, the 1976–77 data was set up as a design on the dependent variables. In the latter case, for each component of reading two new variables were formed which were the sum and difference of the scores in 1976 and 1977. The transformed variables became multiple dependent variables in a one way analysis of variance design, using class of school as the independent factor. It was possible to test all effects of interest using this procedure.

APPENDIX C: ADDITIONAL TABLES

TABLE 13: ANALYSIS OF VARIANCE RESULTS FOR LITERAL COMPREHENSION, 1971 AND 1976
A: SOURCES OF VARIANCE IN LITERAL MEANING, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	139.7	139.7	1.60
Class of School	5	715.7	143.1	1.64
Year by Class	5	278.0	55.6	0.64
Schools within Year by Class	116	10129.5	87.3	

B: MEAN SCORES FOR LITERAL MEANING BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	14.9	14.3	13.9	13.4	12.6	16.2	14.4
1976	14.2	13.8	14.5	13.3	12.2	13.1	14.0

TABLE 14: ANALYSIS OF VARIANCE RESULTS FOR IMPLIED COMPREHENSION, 1971 AND 1976
A: SOURCE OF VARIANCE IN IMPLIED MEANING, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	416.9	416.9	4.81 *
Class of School	5	850.1	170.0	1.96
Year by Class	5	283.0	56.6	0.65
Schools within Year by Class	116	10060.9	86.7	

* significant at .05 level

B: MEAN SCORES FOR IMPLIED COMPREHENSION BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	12.4	12.0	11.4	10.9	10.3	13.0	11.9
1976	11.5	11.1	11.7	10.2	9.2	9.2	11.2

TABLE 15: ANALYSIS OF VARIANCE RESULTS FOR TOTAL COMPREHENSION SCORE, 1971 AND 1976
A: SOURCES OF VARIANCE IN TOTAL COMPREHENSION SCORE, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	1039.4	1039.4	3.07
Class of School	5	3063.2	612.6	1.81
Year by Class	5	1109.6	221.9	0.66
Schools within Year by Class	116	39265.0	338.5	

B: MEAN SCORES FOR TOTAL COMPREHENSION BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	27.2	26.3	25.2	24.3	22.8	29.2	26.3
1976	25.7	24.8	26.1	23.6	21.4	22.4	25.2

TABLE 16: ANALYSIS OF VARIANCE RESULTS FOR VOCABULARY, 1971 AND 1976
A: SOURCES OF VARIANCE IN VOCABULARY, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	2416.3	2416.3	9.70 **
Class of School	5	2245.8	449.2	1.80
Year by Class	5	507.1	101.4	0.41
Schools within Year by Class	116	28908.0	249.2	

** significant at .01 level

B: MEAN SCORES FOR VOCABULARY BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	18.7	17.7	17.1	16.3	15.3	20.7	17.9
1976	16.8	15.9	16.6	15.0	13.2	14.5	16.3

TABLE 17: ANALYSIS OF VARIANCE RESULTS FOR SPEED OF READING, 1971 AND 1976
A: SOURCES OF VARIANCE IN SPEED OF READING, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	6625.2	6625.2	5.81*
Class of School	5	10486.1	2097.2	1.84
Year by Class	5	3094.6	618.9	0.54
Schools within Year by Class	116	132350.0	1141.0	

* significant at .05 level

B: MEAN SPEED OF READING SCORES BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	46.0	44.0	42.3	40.5	38.1	49.9	44.1
1976	42.5	40.7	42.7	38.6	34.6	36.9	41.5

TABLE 18: ANALYSIS OF VARIANCE RESULTS FOR BASIC READING TEST, 1971 AND 1976
A: SOURCES OF VARIANCE IN BASIC READING TESTS, 1971 AND 1976

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio
Year of Testing	1	412.5	412.5	1.90
Class of School	5	1910.0	382.0	1.76
Year by Class	5	605.6	121.1	0.56
Schools within Year by Class	116	25192.2	217.2	

B: MEAN SCORES ON BASIC READING TEST BY CLASS OF SCHOOL, 1971 AND 1976

Year	Class of School						All Schools
	1	2	3	4	5	6	
1971	28.4	27.5	27.3	26.5	25.3	30.0	27.8
1976	27.5	26.6	28.1	25.8	23.8	25.0	27.1

TABLE 19: ANALYSIS OF VARIANCE RESULTS FOR COMPONENTS OF READING TEST QR5, 1976 AND 1977

A: SUMMARY OF ANALYSIS OF VARIANCE RESULTS FOR COMPARISON OF 1976 AND 1977 SCORES ON COMPONENTS OF READING TEST QR5

Effect	Degrees of Freedom	F Ratio					
		Literal Meaning	Implied Meaning	Total Comprehension	Vocabulary	Speed of Reading	Basic Test
Year of Testing	(1,56)	0.43	0.26	0.35	0.23	0.30	0.00
Class of School	(5,56)	0.93	0.69	0.80	0.87	0.85	1.14
Year by Class	(5,56)	0.84	0.84	0.77	0.69	0.71	1.02

B: MEAN SCORES FOR EACH COMPONENT OF READING TEST QR5 BY CLASS OF SCHOOLS, 1976 AND 1977

Measure	Year	Class of School						All Schools
		1	2	3	4	5	6	
Literal Meaning	1976	14.2	13.8	14.5	13.3	12.2	13.1	14.0
	1977	14.2	14.6	14.1	14.2	14.4	12.2	14.2
Implied Meaning	1976	11.5	11.1	11.7	10.2	9.2	9.2	11.2
	1977	11.4	11.5	11.5	11.0	10.9	10.0	11.4
Total Comprehension	1976	25.7	24.8	26.1	23.6	21.4	22.4	25.2
	1977	25.6	26.1	25.6	25.2	23.3	22.2	25.7
Vocabulary	1976	16.8	15.9	16.6	15.0	13.2	14.5	16.3
	1977	16.7	16.9	16.9	16.1	15.0	11.3	16.6
Speed of Reading	1976	42.5	40.7	42.7	38.6	34.6	36.9	41.5
	1977	42.3	43.0	42.4	41.3	38.3	33.5	42.3
Basic Reading Test	1976	27.5	26.6	28.1	25.8	23.8	25.0	27.1
	1977	27.4	27.5	27.4	27.0	24.9	22.2	27.3